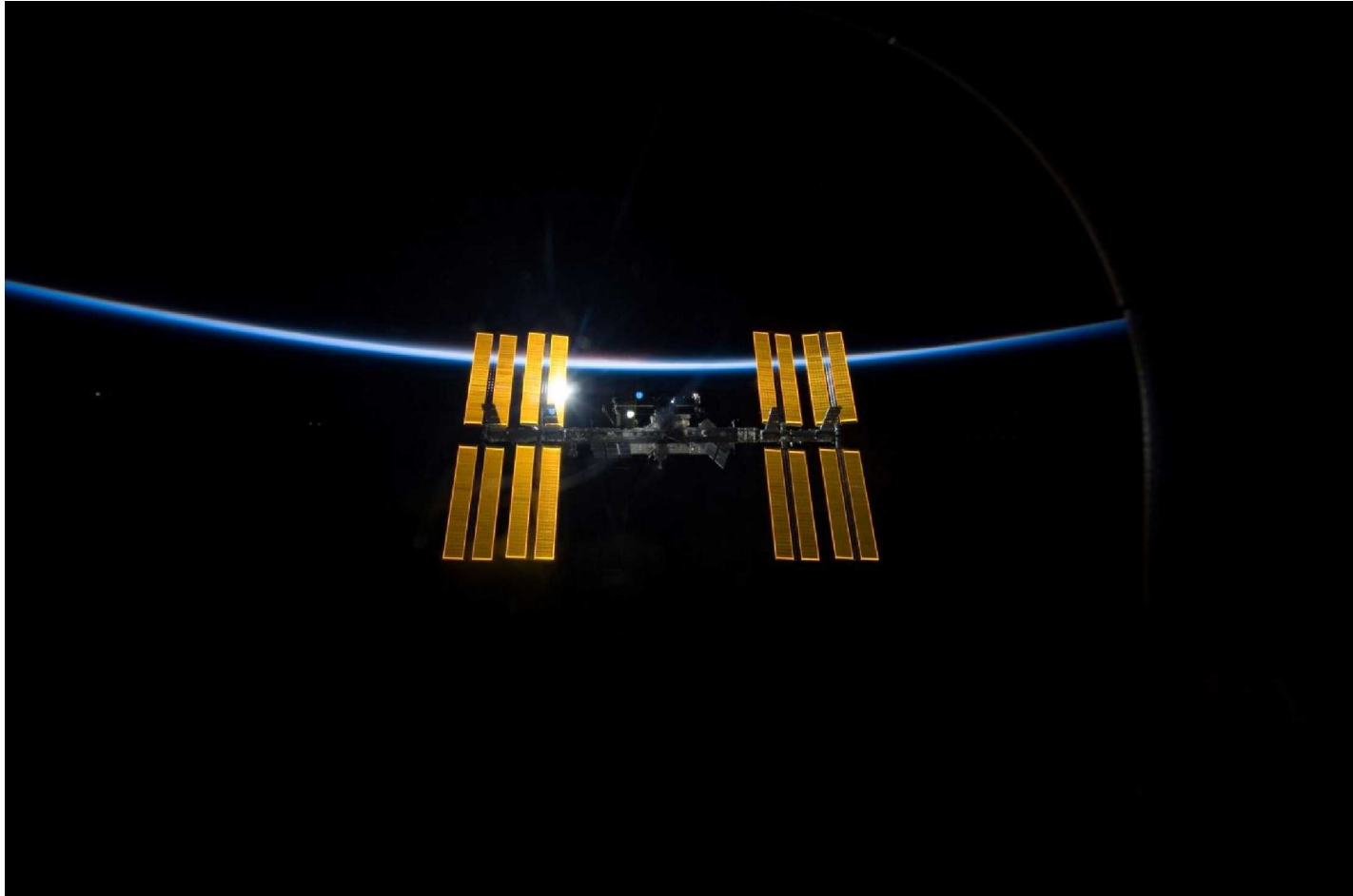


Right Ventricular Tissue Doppler in Space Flight

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Space Normal Right Ventricle



S119E010500

Background

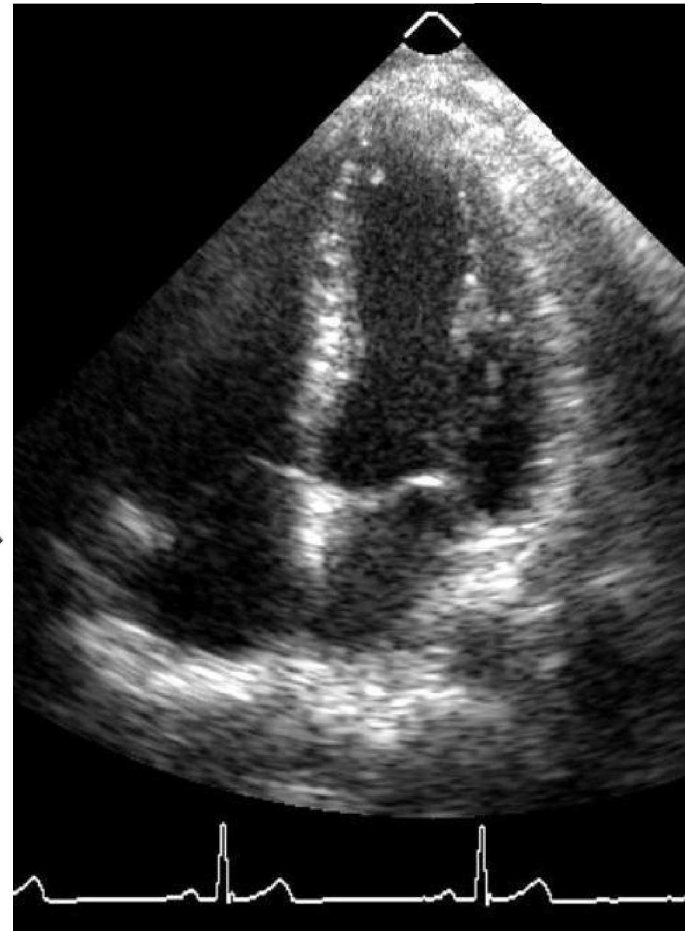
- First Right-Ventricle Tissue Doppler from ISS
- Subset of data from SDTO “Bracelet-M”
- Russian Countermeasure
 - Medical prevention strategy for reducing fluid shifts in microgravity in long-duration crew
 - Acute change in effective circulating volume

Physiology of the Right Ventricle

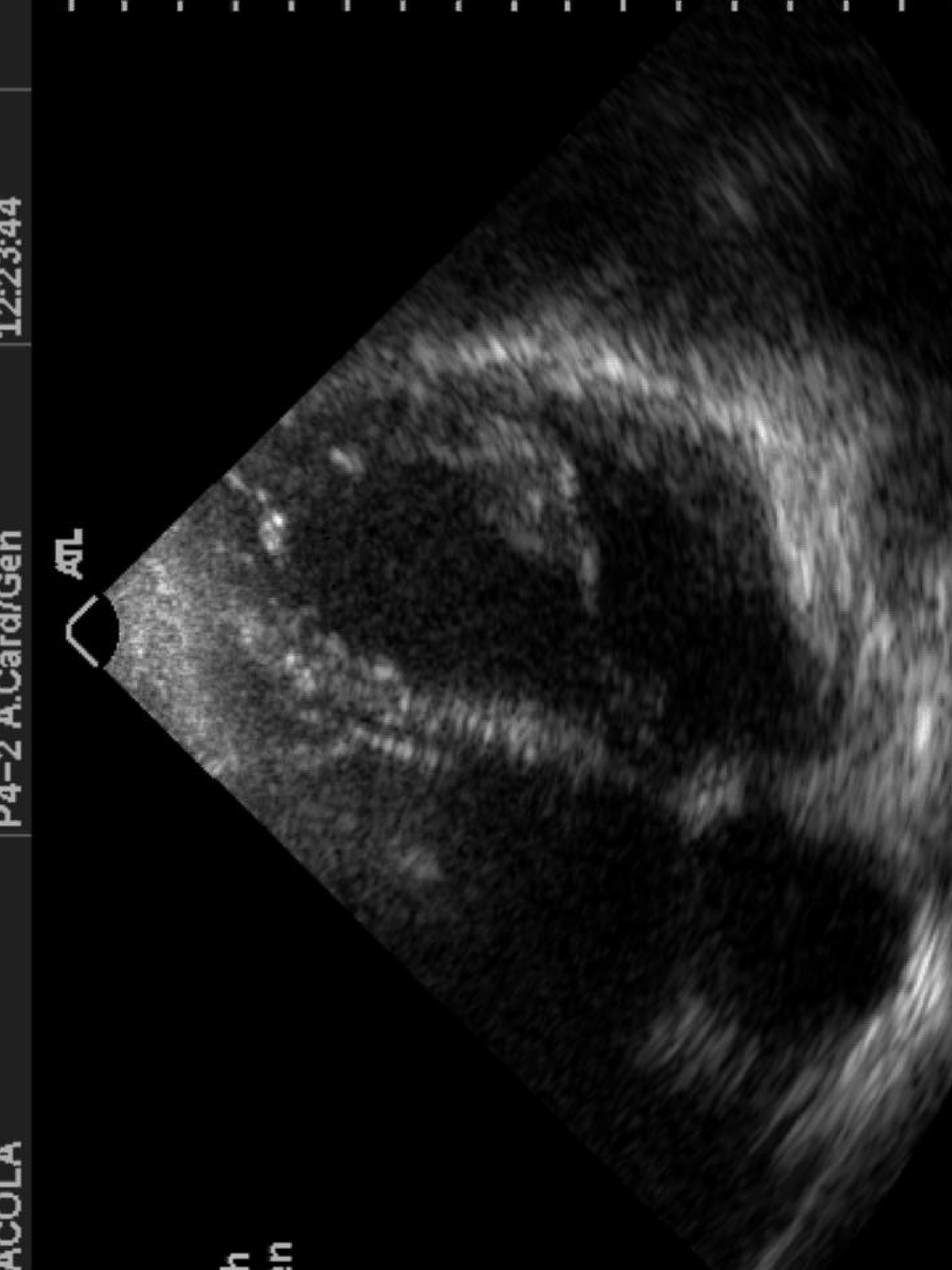
- Transpulmonary gradient of 5 mmHg to drive blood flow across pulmonary circulation
- RV contraction peaks early in systole (brief) drops rapidly
- RV ejection into a low-impedance pulmonary circulation
- RV diastolic volume 20-30% > LV despite lower diastolic pressure
- Compliant

Imaging difficulties

- Difficult to assess mass & volumes due to geometry

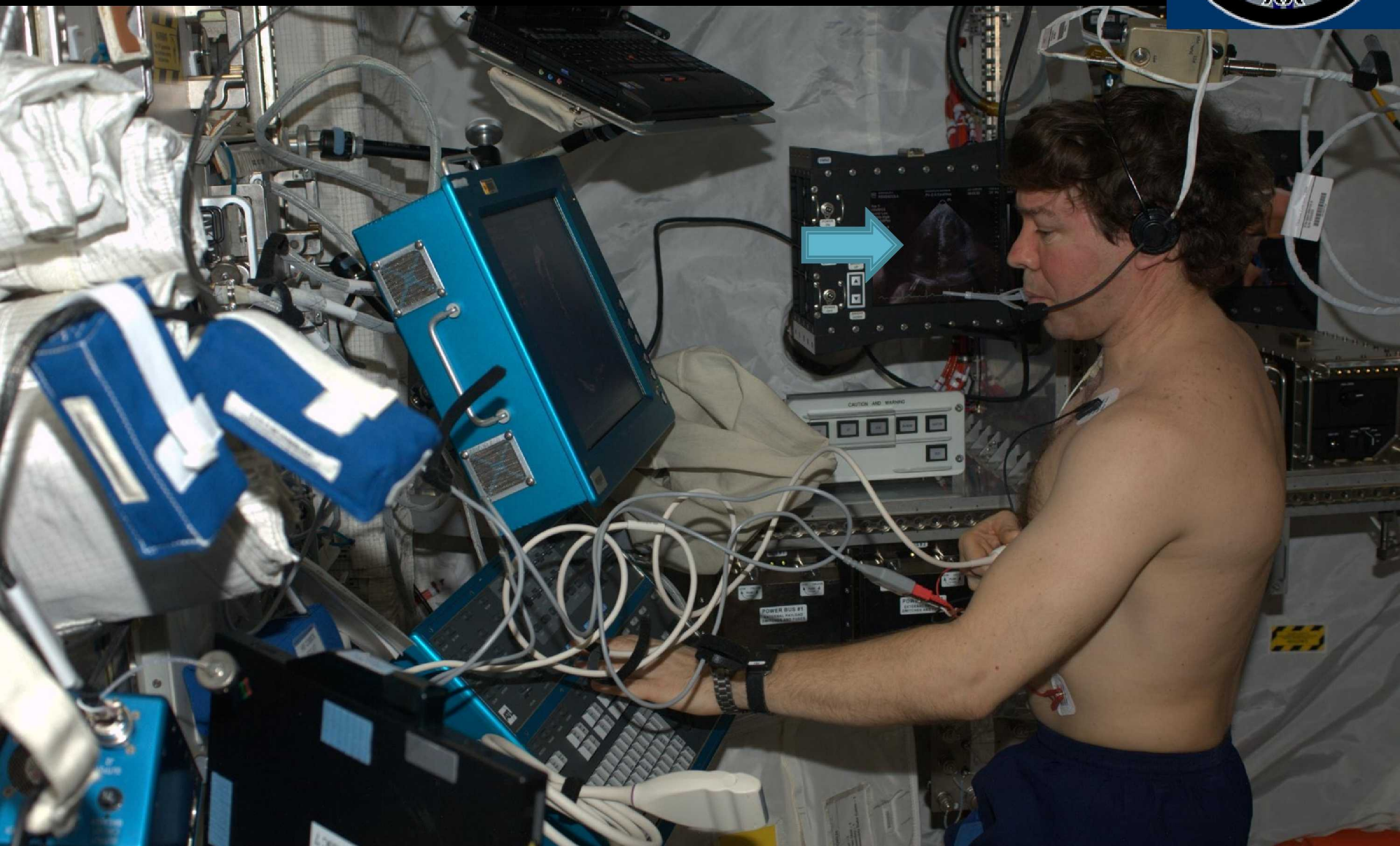


ATL

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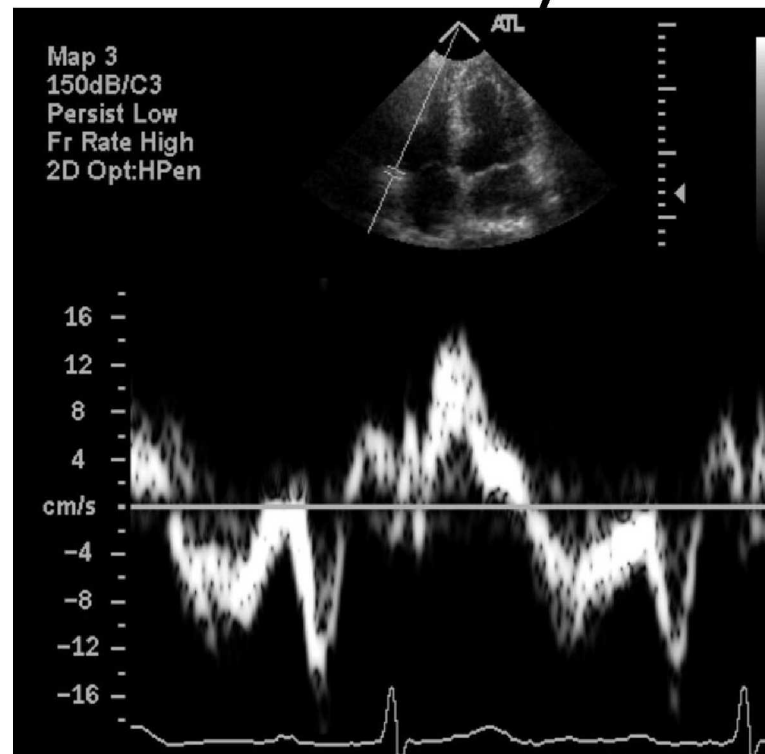
Methods

- Remote Guidance
 - Communication 1.8- to 2-second delay between operator on board the ISS and expert instruction mission control.
- Operator
 - Astronaut on colleague astronaut crewmembers
 - Operators utilizing a self-scanning technique
- Nine sessions with and without Braslet

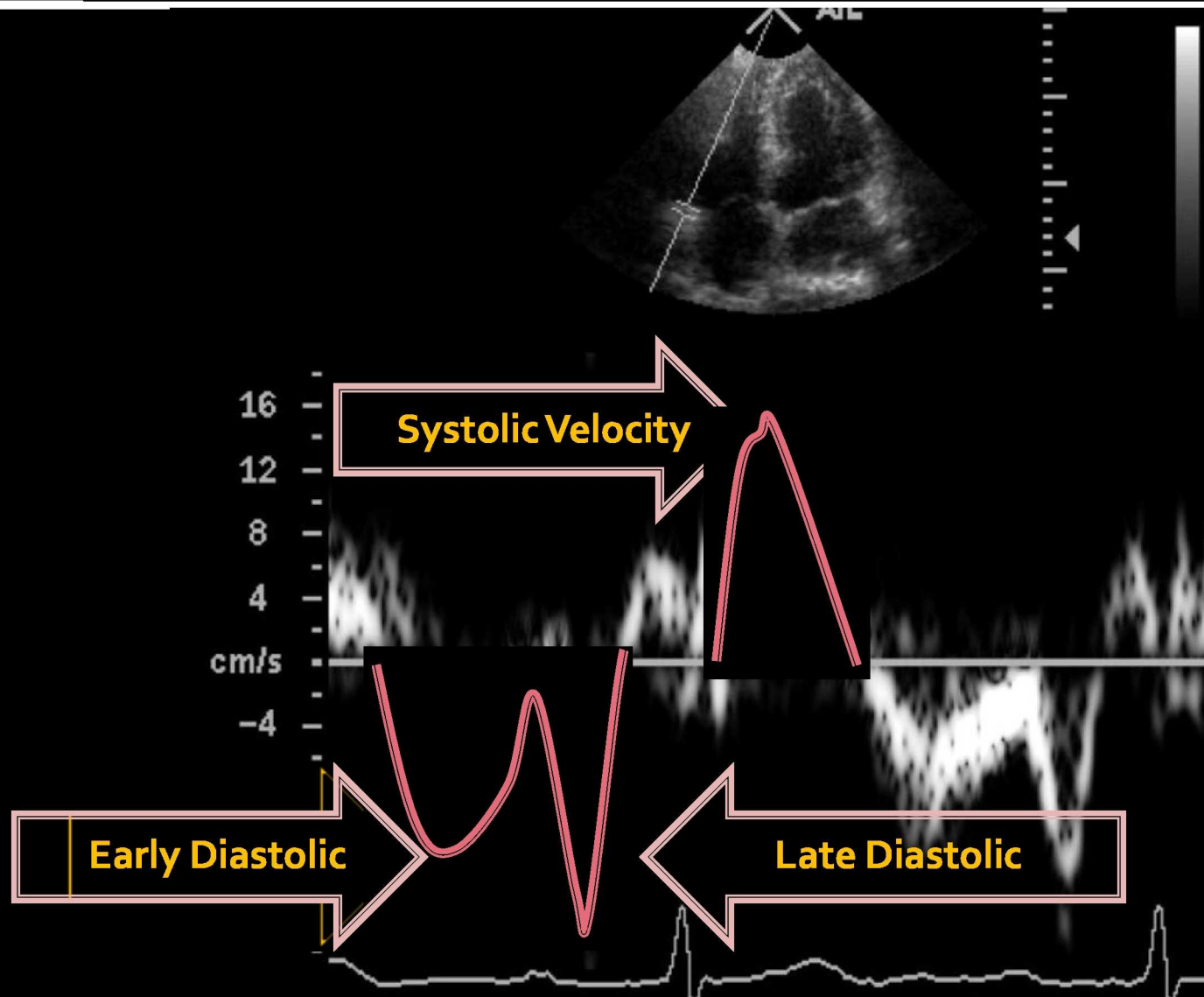


Tissue Doppler Spectrum

- Tissue Doppler spectrum registers movement of a given sample of cardiac tissue throughout the cardiac cycle

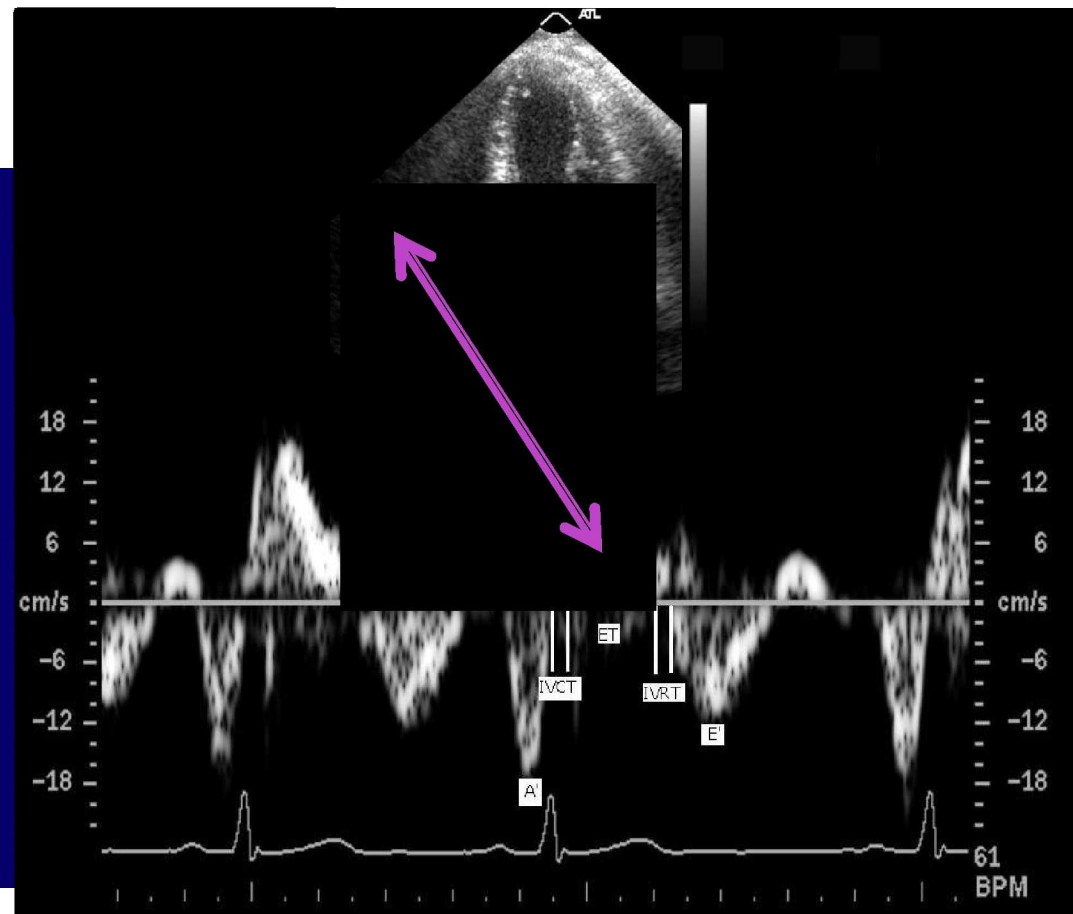
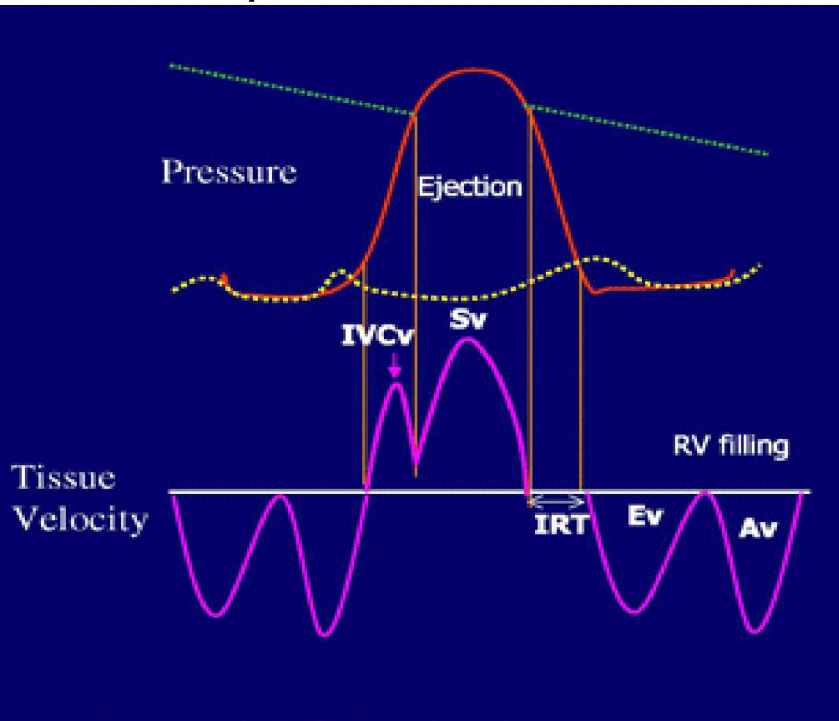


RV Tissue Doppler



Rt Tei Index

- $IVCT + IVRT / ET$
- Myocardial Performance



* Tei et al, Doppler Echocardiography Index for Assessment of Global Right Ventricular Function, J of A Soc. Echocardiography, 1996, vol.9, #6

HDI
5000

BRASLET
PENSACOLA

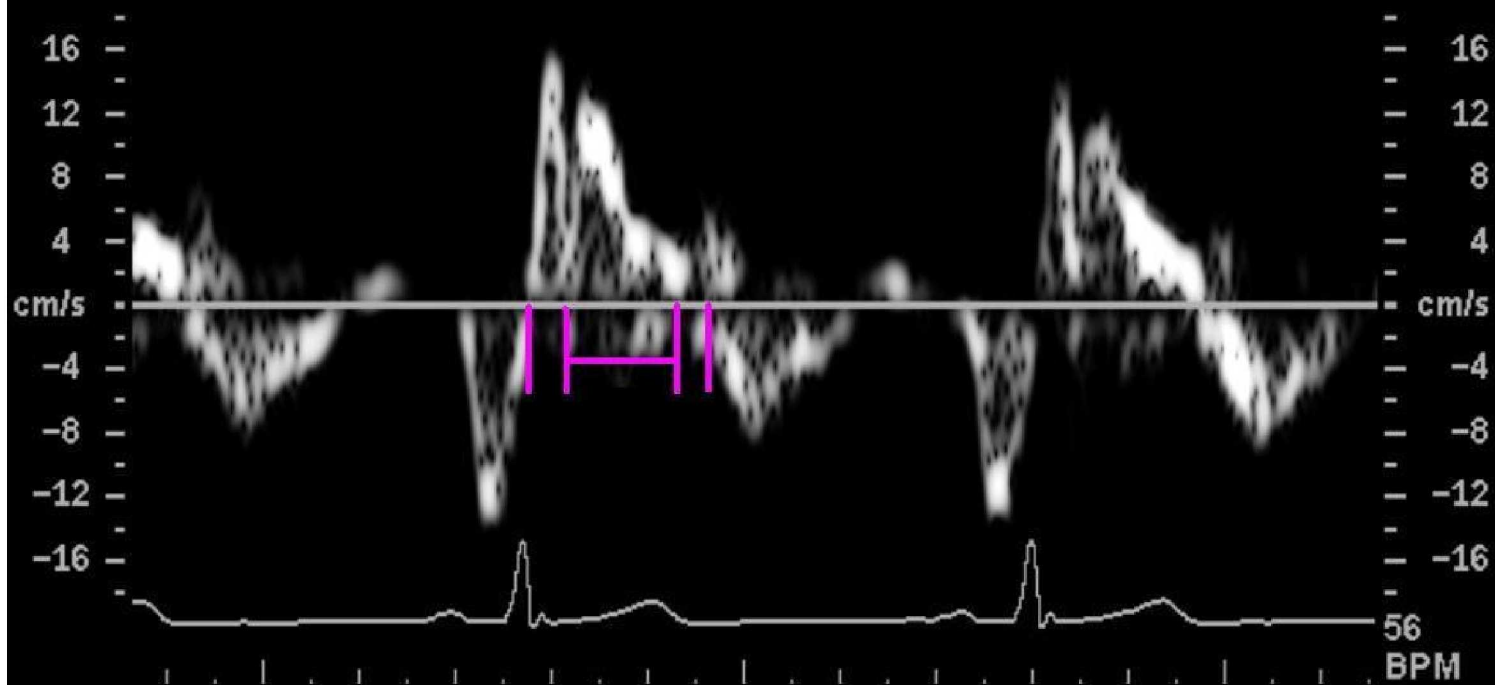
P4-2 A.Card/Gen

11:22:49

Map 3
150dB/C3
Persist Low
Fr Rate High
2D Opt:HPen

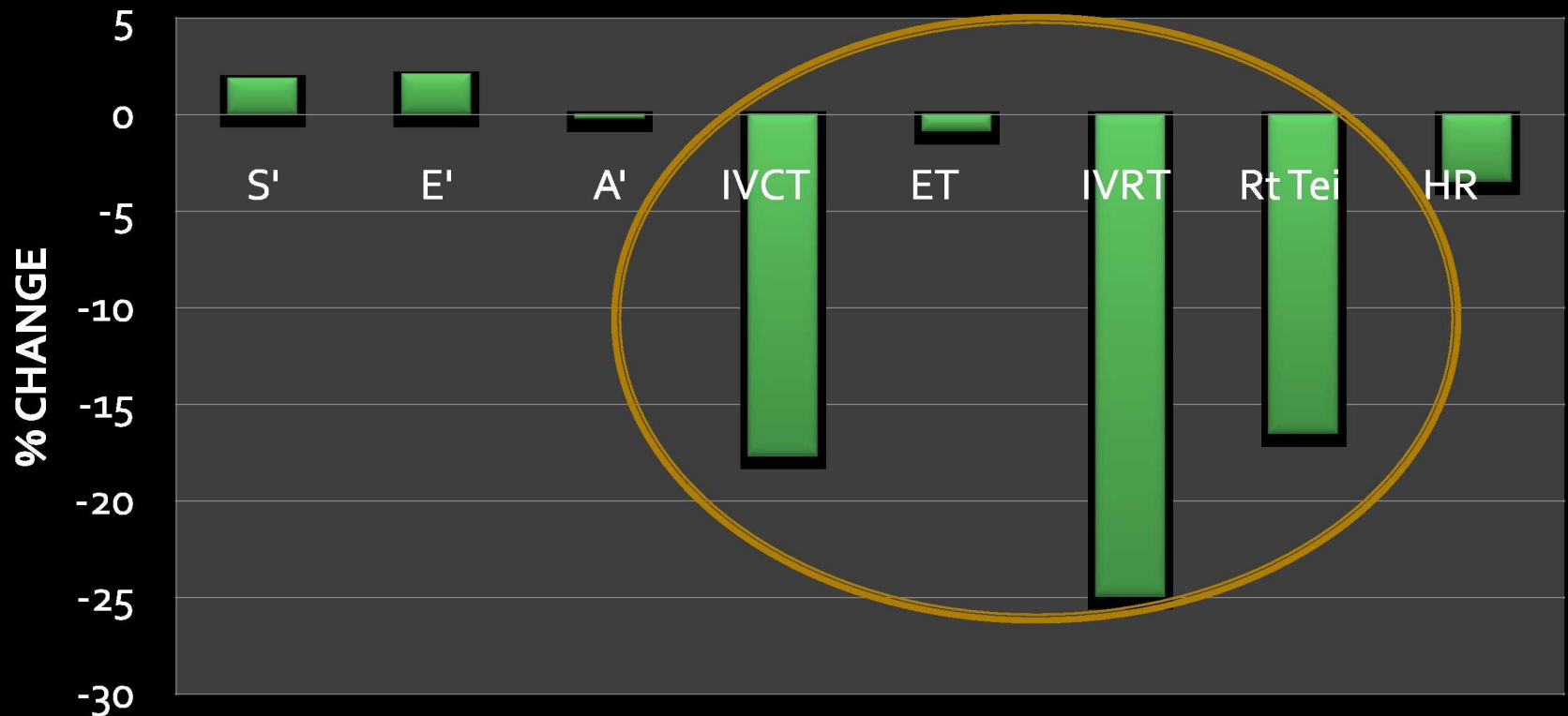


SV Angle 0°
Dep 12.4cm
Size 5.0 mm
Freq 2.0 MHz
Dop 37% Map 2
PRF 1000 Hz



Summary of Results

Space Normal % Change Right Ventricle Parameters
after Preload Reduction



Summary

- Unique data :acute preload change on RV
- Space Normal Tei index larger in microgravity than normal Tei index (< 0.3)
- Tissue Doppler can be performed by crew with high fidelity
- Need larger sample for better fidelity on Space Normal RV function
- More image data for RV Mass and Volume